

# **Federal Policy and the Rise in Disability Enrollment: Evidence for the VA's Disability Compensation Program**

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**Abstract:** The U.S. Department of Veterans' Affairs (VA) currently provides disability benefits to 13 percent of the nation's military veterans through the Disability Compensation (DC) program. The key medical eligibility criterion is the same for all veterans: the disability must have been caused or aggravated by military service. But a legislative change, implemented in July of 2001, made it easier for Vietnam veterans who served in the Vietnam theater to receive DC benefits for diabetes potentially associated with military service. In this paper, we investigate the impact of this policy change on DC enrollment and expenditures and on the behavior of Vietnam veterans potentially affected by it. Our findings demonstrate that the legislative change increased DC enrollment by 6 percentage points among Vietnam veterans and that an additional 1.7 percent experienced an increase in their DC benefits, increasing annual program expenditures by \$2.85 billion in 2007. Using individual-level data from the Veterans' Supplement to the Current Population Survey, we find that the induced increase in DC enrollment had little average impact on the labor supply or health status of Vietnam veterans, but did reduce labor supply among their spouses.

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## **I. Introduction**

A large body of recent research has examined the economic impact of public disability insurance programs, due in large part to the rising fraction of nonelderly adults receiving disability benefits in the US and other industrialized countries. These studies examine the causes for the rise in disability insurance receipt as well as the behavioral consequences of program enrollment. Previous studies of U.S. programs focus almost entirely on the two largest disability insurance programs in the US: Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI). However, virtually no previous research has examined the Disability Compensation (DC) program, which is the nation's third largest disability program. The DC program is administered by the U.S. Department of Veterans' Affairs and currently provides \$31 billion per year in benefits to more than to three million veterans and their families. In a review of disability insurance studies by Bound and Burkhauser (1999), 44 papers consider SSDI, 17 consider SSI, while just one considers the DC program.<sup>1</sup>

In this paper, we aim to fill this gap in the literature by estimating how a little-noticed expansion to the Disability Compensation program's medical eligibility criteria affected the program's enrollment and expenditures and how the resulting increase in DC enrollment affected labor supply, health, and economic well-being of potential beneficiaries. Previous researchers have examined these issues for the SSDI and SSI programs (Parsons, 1980; Bound, 1989; Black, Daniel, and Sanders, 2002; Autor and Duggan, 2003; Chen and Van der Klaauw, 2007) and for similar programs in other countries (Borsch-Supan, 2000; Gruber, 2000). However, because programs such as SSDI and SSI are federally-administered with uniform eligibility criteria and benefit formulas nationwide, it has proven difficult to obtain an appropriate comparison group with which to estimate either the causes or the consequences of disability program enrollment.

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<sup>1</sup> By the end of 2008, 7.43 million disabled adults were enrolled in SSDI, 5.18 million were enrolled in SSI, and 2.94 million were enrolled in the DC program. The sole paper that considers the DC program by Burkhauser and Daly (1999) compares the economic well-being of individuals who receive SSDI, SSI, DC, or Workers' Compensation benefits in the U.S. with those receiving disability benefits in Germany.

To shed light on these issues for the VA's Disability Compensation program, we focus on a recent change to the program's medical eligibility criteria that deemed type II diabetes associated with wartime-exposure to herbicides such as Agent Orange a compensable disability for Vietnam veterans. Prior to this change, there was little to no medical evidence that credibly established an association between herbicide exposure and diabetes onset, so veterans seeking DC benefits for diabetes rarely satisfied the program's service-connectedness criterion. However, in October of 2000, the National Institute of Medicine issued a report that linked exposure to Agent Orange, an herbicide used by the U.S. military in Vietnam, to the onset of diabetes.

In response to the report, the VA defined diabetes a *presumptively service-connected* disability for Vietnam veterans who served in the Vietnam theater, which became effective in July 2001.<sup>2</sup> Presumption meant that Vietnam veterans did not have to prove exposure to Agent Orange during military service, or that herbicide exposure was the direct cause for their diabetes onset, to qualify for DC benefits. Instead, service-connectedness would be presumed based on dates and locations of service. The policy did not apply to veterans from other service eras or Vietnam era veterans who did not serve in Vietnam or surrounding areas, which allows us to use other veterans as a comparison group when estimating the effect of the program.

According to Figure 1, which plots annual DC enrollment from 1976 to 2008, there was a significant acceleration in DC enrollment that coincided with the advent of the policy. From 1996 to 2001, the number of DC recipients increased by just 0.6 percent per year; but during the next seven years, the annual growth rate was 3.5 percent. The growth in DC rolls immediately after the policy suggests that the expansion to the eligibility criteria for Vietnam veterans was the main cause.

We first quantify the effect of the policy on DC enrollment and expenditures attributable to Vietnam veterans using administrative data. We employ a difference-in-differences identification

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<sup>2</sup> The legislative change equally applies to veterans who served in the Vietnam theater: on the ground in, in the air above, and in the waters surrounding Vietnam, Laos, and Cambodia. In this paper, we refer to all veterans affected by this policy as Vietnam veterans, and refer to the Vietnam theater as Vietnam. Vietnam Era veteran refers to any veteran who served between 1964 and 1975, regardless of whether they served in the Vietnam theater or not.

strategy, exploiting the fact that the policy applied only to Vietnam veterans. We consider peacetime era veterans as our comparison group; the vast majority of who served shortly before or after the Vietnam conflict. The key identifying assumption of our approach is that the change in DC enrollment and expenditures would have been the same for the two groups after 2001 in the absence of the policy change, which is supported in Figure 2 by their similar trends in enrollment and expenditures before the policy was implemented.

The results of our analyses suggest that the change to the DC program's eligibility criteria increased the number of Vietnam veterans on the program in September of 2008 by more than 200 thousand, amounting to 3.2 percent of Vietnam era veterans and 6.0 percent of Vietnam era veterans who served in or around Vietnam.<sup>3</sup> Our results further indicate that an additional 65,000 Vietnam veterans who were receiving DC benefits in the summer of 2001 qualified for an increase in their benefits because of the policy change. We use a similar methodology and the same treatment and comparison groups to investigate the effect of the change on program expenditures. Our estimates suggest that DC expenditures during the 2007 fiscal year were \$2.85 billion higher than they would have been without the legislative change, which implies an average increase of approximately \$1000 per month in cash benefits per affected DC beneficiary.

Given the discrete change in medical eligibility criteria and the apparent rise in DC benefit receipt, we next estimate the impact of DC benefit generosity on labor supply, health, and economic well-being of Vietnam veterans. We use several years of individual-level data from the biennial Veterans Supplement to the Current Population Survey (CPS) which, unlike the administrative data used in the enrollment and expenditure analysis, reports whether a Vietnam era veteran actually served in or around Vietnam. This additional information not only allows for the identification of veterans directly affected by the policy, but also allows for the identification of an arguably better comparison

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<sup>3</sup> According to the CPS Veterans Supplement in 1997, 1999, and 2001, 47 percent of Vietnam era veterans report that they served in Vietnam, Cambodia, or Laos. The remaining 53 percent were unaffected by the policy.

group than peacetime veterans: Vietnam era veterans who did not serve in Vietnam. In comparison to peacetime era veterans, the age distribution among Vietnam era veterans who did not serve in Vietnam is more comparable to the age distribution among Vietnam veterans who did.

Using the CPS data, we first confirm that DC benefit receipt accelerated among Vietnam veterans after the policy relative to Vietnam era veterans who did not serve in or around Vietnam. We estimate that DC enrollment from 2001 and 2005 increased by 4 percentage points more among Vietnam veterans than among other veterans from the same service era. This estimated increase in DC enrollment is similar to the estimate derived from administrative data after adjusting for the different years used in the two analyses.

After confirming the rise in DC enrollment among Vietnam era veterans after the policy, we estimate the impact of DC benefits on other outcomes of interest. First, our findings provide little evidence to suggest that the increase in disability benefit enrollment reduced the labor supply of affected Vietnam veterans, though the large standard errors of our estimates do not rule out a wide range of labor supply effects. We do find some suggestive evidence that the wives of Vietnam veterans significantly reduced their labor supply in response to the policy change. This is consistent with findings from previous research that wealth effects through transfer income may not affect labor supply decisions of the recipient (Krueger and Pishke, 1992), but may affect others in the same household (Cullen and Gruber, 2000). And finally, our results suggest little impact on the health of Vietnam veterans as measured by self-reported disability status, though we do find some evidence of an increase in household income for those veterans affected by the policy change.

## **II. The Effect of the Agent Orange Decision on Disability Enrollment and Expenditures**

Theoretically, one would expect the Agent Orange decision to increase the number of Vietnam veterans applying for DC benefits. As Parsons (1980), Bound (1989), and others have noted, the probability that an award is made is a key determinant of an individual's decision to apply for

disability benefits. An effect of the policy on the application decision is most plausible for those who were previously diagnosed with diabetes; but the policy may also have encouraged previously undiagnosed diabetics to request a medical checkup, which may lead to detection of diabetes or other health problems.<sup>4</sup> Additionally, DC beneficiaries may be compensated for more than one disability, so the policy change also increased the incentive for existing DC recipients who served in Vietnam to apply for an increase in their monthly benefit.

If a DC award is made, the increase in DC benefits depends on the severity of diabetes, which is quantified using a disability scale ranging from 0 to 100 by increments of 10 percent. If a veteran was already receiving disability benefits, then the diabetes rating is combined with the ratings of the pre-existing conditions to yield the combined disability rating (CDR).<sup>5</sup> If a veteran has only one disability, the rating of that disability is necessarily the CDR. The monthly DC benefit increases with the CDR, so the increase in DC benefits from diabetes depends on the change in the CDR due to an additional diabetes rating. The potential increase in monthly benefits for diabetes ranges from \$112 to \$2,393 per month in 2006.<sup>6</sup>

#### *A. Differences-in-Differences Estimates of the Impact on DC Enrollment*

To estimate the impact of the policy change on DC enrollment, we employ VA administrative data, contained in the agency's *Annual Benefits Report*, on the number and characteristics of individuals receiving DC benefits at the end of the previous fiscal year. This information includes the number of DC recipients with certain diagnoses, the average monthly benefit received, and many other

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<sup>4</sup> According to a CDC report (2003), approximately one third of diabetics in US are undiagnosed. See Singleton (2009) for an analysis of self-reported rates of diagnosed diabetes among veterans and non-veterans in response to the Agent Orange decision.

<sup>5</sup> If a claimant has multiple disabilities, only the claimant's residual ability is considered when determining the impact of the next disability considered. For example, if a veteran has two disabilities rated at 50%, then only 50% of his ability is considered when determining the impact of the second disability. Therefore, his CDR would be 80%; the sum of 50% for the first and 25% for the second ( $.5*(1-.5)$ ) rounded to the nearest increment of 10%.

<sup>6</sup> If the CDR is greater than 30 percent, a veteran may receive additional benefits if they have qualifying dependent spouses, children, or parents. The benefit can also increase for those with ratings of 60 percent or more and who are deemed unemployable. For detailed information on the DC application and determination process as well as benefit determination, see Duggan, Rosenheck, and Singleton (2006).

variables of interest. This data is further broken down by service era, though it does not distinguish between Vietnam era veterans who served in Vietnam from those who did not.

We use a difference-in-differences strategy to estimate the impact of the policy change on enrollment. Intuitively, this strategy assumes that the change in DC enrollment among the affected population consists of two distinct and independent components: the direct effect of the policy and a systemic effect unrelated to the policy such as the change caused by macroeconomic conditions. The unrelated, systemic effect is estimated by first identifying a reasonable comparison group that is plausibly unaffected by the policy. The change in DC enrollment among this comparison group is the estimated systemic effect which, when subtracted from the overall change in DC enrollment among the affected population, yields the estimated effect of the policy. The key assumption of this identification strategy is that the change in DC enrollment among the comparison and treatment groups would have been the same in the absence of the policy. Therefore, the reliability of the difference-in-differences estimator depends critically on the chosen comparison group.

Ideally, the treatment and comparison groups should be similar with respect to background characteristics such as age and education, and exhibit similar trends in DC enrollment shortly before the policy change. As mentioned above, we choose all Vietnam era veterans as our treatment group, rather than only those who served in and around Vietnam, since the administrative data are not disaggregated by location of service within service eras. The remaining data are aggregated into four service eras which serve as possible comparison groups: veterans from World War II, the Gulf War, the Korean War, and all peacetime eras. We choose peacetime veterans as the comparison group for two reasons. First, they exhibited similar trends in DC enrollment as Vietnam era veterans prior to the policy change. Second, the mean age among peacetime veterans is very similar to Vietnam era veterans, since most peacetime veterans served shortly before or after the Vietnam conflict. World War II and Gulf War veterans are not suitable comparison groups because their age distribution is so different from that of Vietnam veterans. And although Korean veterans exhibited similar pre-existing

trends in DC enrollment relative to Vietnam era veterans, the average age among Korean veterans is considerably greater than Vietnam era veterans.<sup>7</sup>

Figure 2 displays the fraction of Vietnam and peacetime era veterans receiving DC benefits in September of each year from 1998 through 2008. As is clear from the figure, the trends for the two groups were fairly similar from 1998 to 2001, with the rate of enrollment increasing from 9.0 to 9.4 percent among Vietnam veterans and from 8.1 to 8.7 percent among peacetime veterans. The trend for the peacetime group was quite similar during the next seven years, with 10.2 percent of peacetime veterans receiving DC benefits by the end of the 2008 fiscal year. But the increase in DC enrollment among Vietnam era veterans was almost three times as large during this same six-year period, with their enrollment rising by 4.2 percentage points from 9.4 to 13.6 percent. Thus our differences-in-differences estimate, which represents the effect of the Agent Orange decision on the change in DC enrollment from September of 2001 to September of 2008, is 2.7 percentage points.<sup>8</sup>

Although the pre-policy trends in DC enrollment among Vietnam and peacetime era veterans were similar, the increase for the latter group from 1998 to 2001 was actually slightly greater. If DC enrollment would have continued along its pre-policy trend in absence of the policy, rather than the post-policy trend of peacetime veterans assumed by the difference-in-differences estimator, then the estimated impact of the policy would be understated. As an alternative, we estimate the impact of the policy as the difference between actual DC enrollment in 2008 and the predicted rate of enrollment based on the pre-existing trend among Vietnam era veterans, yielding a slightly greater estimate of 3.2 percentage points.<sup>9</sup>

Given that there were approximately 7.45 million Vietnam-era veterans alive in September of

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<sup>7</sup> According to data from the VA, the average ages of Korea War, Vietnam War, and peacetime era veterans in September of 2002 were 72, 57, and 53, respectively.

<sup>8</sup> This is equal to the difference between the increases of 4.2 and 1.5 percentage points from 2001 to 2008. This estimate and the one in the next paragraph would be almost identical if we instead used 2000 as the baseline.

<sup>9</sup> The actual increase in DC enrollment among Vietnam era veterans from 2001 to 2008 exceeded the increase one would have expected based on the pre-2001 trend by 3.2 percentage points (13.6 versus 10.4 percent). The corresponding difference for peacetime era veterans was just 0.2 percent.(10.2 versus 10.0 percent).



2008, our estimates suggest that the Agent Orange decision increased DC enrollment by between 201 and 238 thousand above what it otherwise would have been. Since the policy applied only to the 3.6 million Vietnam era veterans who served in Vietnam and the surrounding areas, the expanded eligibility criteria induced approximately a 6 percentage point increase in DC enrollment among Vietnam veterans.

In addition to new beneficiaries, the policy may have increased the award amount among pre-existing DC beneficiaries. To estimate the magnitude of this effect, in the first column of Table 1 we list the number of new DC recipients in each year from 1998 to 2006 with an endocrine system disorder (typically diabetes) as a covered condition. In the second column we list the number of DC recipients at the end of the year with this same type of condition covered. The difference between the increase in the stock of recipients with an endocrine disorder and the flow of this condition among new recipients is our measure of the number of pre-existing beneficiaries who qualified for an increase in DC benefits.

Consider as an example the change from 2000 to 2001, when the number of DC recipients with an endocrine system condition increased by 9,321 whereas the number of new awards with this condition was just 5,913. Thus we estimate that at least 3,408 existing DC recipients received an increase in their benefit, as shown in the third column. The actual number is presumably somewhat larger, as some of those on the program at the end of 2000 would have left the program by 2001. To adjust for this, we inflate our estimates in column 3 by 1341 in each year, the average number leaving in the two previous years as shown in the two preceding rows. With this adjustment, we estimate that by the end of 2006 (the most recent year with diagnosis data) approximately 65,000 DC recipients experienced an increase in their monthly benefit because of the policy change.<sup>10</sup>

Taken together, our estimates in this section suggest that between 265 and 300 thousand

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<sup>10</sup> By September of 2006 (the most recent year of diagnosis data), 21.9 percent of Vietnam era veterans on the DC program had diabetes as a covered condition versus 1.8 percent for all other DC recipients.

Vietnam veterans, which represents 7.4 to 8.3 percent of those who served in the Vietnam theater during the War, became newly eligible for DC benefits or experienced an increase in their monthly benefit as a result of the 2001 Agent Orange decision.

*B. The Impact of the Agent Orange Decision on Disability Compensation Expenditures*

To estimate the impact of the policy on DC expenditures, we use administrative data and an identification strategy similar to the previous subsection on DC enrollment. The data, provided in Table 2, indicate that total monthly benefits increased considerably among Vietnam era veterans after the policy change compared to peacetime era veterans. To estimate the effect of this change on program expenditures, we estimate what aggregate DC benefits for Vietnam era veterans would have been in September of 2007 if the pre-policy expenditure trend had continued. Our projection for monthly DC spending in 2007, which is listed in Table 2, is \$238 million lower than actual spending. The corresponding projection for peacetime era veterans is almost identical to the actual level of expenditures in 2007, with a difference of less than \$1 million. This result suggests that the Agent Orange decision increased annual spending by \$2.85 billion, which accounts for 52 percent of the acceleration in overall DC spending from 2001 to 2007.<sup>11</sup> Given our estimate that 240,000 Vietnam veterans were affected by the policy by September of 2007, this suggests that the average increase in transfer income for affected veterans was approximately \$1000 per month.<sup>12</sup>

We also rely on simplified calculations to estimate the impact of the policy on long-run expenditures. First, for the 2002 to 2006 fiscal years, we simply linearly interpolate the 2007 estimate. This would, for example, assume that 50 percent of the \$2.85 billion expenditure effect had occurred by 2004. For future years, we deflate the 2007 estimate by the VA's estimated decline in the Vietnam era veteran population. For example, the VA estimates that the number of Vietnam era veterans will decline by 17.5 percent from 2007 to 2017, and we therefore assume an expenditure effect of \$2.35

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<sup>11</sup> Table 2 shows that the difference between actual and projected total monthly DC spending was \$460 million.

<sup>12</sup> The number of affected veterans considered is slightly lower than estimated in the preceding section using data through 2008 given that the most recent year of DC expenditure available is 2007.

billion in that latter year.<sup>13</sup> Using this algorithm along with an annual real discount rate of 3 percent, we estimate that the present value of DC spending increased by more than \$50 billion dollars (in 2007 dollars) as a result of the expanded medical eligibility criteria.<sup>14</sup>

### **III. The Impact on Vietnam Veterans – Evidence from the Veterans’ Supplement to the CPS**

According to the previous subsection, the Agent Orange policy significantly increased DC enrollment and cash benefits received among Vietnam era veterans. In this section, we estimate the effect of the Agent Orange decision on several outcome variables of interest using data from the Veterans’ Supplements to the Current Population Survey of the Bureau of Labor Statistics. In contrast to administrative data, this data allows us to distinguish Vietnam era veterans who actually served in or around Vietnam from those who did not. Thus, for the CPS data analysis, we define the former as the treatment group and the latter as the comparison group. We use data from every odd-numbered year between 1997 and 2005 since Veteran Supplement data is collected every two years. Because the 2001 survey was conducted in August, just one month after the policy change, 2001 data are assigned to the pre-policy period.

#### *A. Constructing the Analysis Sample*

We restrict the analysis sample to male Vietnam era veterans born between 1938 and 1954. According to Veterans’ Supplement data in 1997, 1999, and 2001, more than 97 percent of self-reported Vietnam era veterans are males and more than 86 percent of Vietnam era veterans were born in or between 1938 and 1954. According to the data, more than one out of every four men born between 1938 and 1954 is a Vietnam era veteran. The fraction of men who are Vietnam era veterans exceeds 10 percent for all 17 of these year-of-birth cohorts – peaking at more than 40 percent for the 1946 to 1948 birth cohorts - whereas men born before 1938 or after 1954 were much less likely to be

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<sup>13</sup> The VA indexes DC benefits to the Consumer Price Index and thus we do not scale for the effect of inflation.

<sup>14</sup> This estimate may overestimate the impact if newly compensated veterans have lower life expectancies than other Vietnam era veterans. However, it seems more likely that our estimates underestimate the effect, since we do not include additional VHA spending or take into account the continued effect of the policy on DC enrollment.

Vietnam era veterans.<sup>15</sup> Approximately half of Vietnam era veterans born between 1938 and 1954 actually served in or around Vietnam.

We present summary statistics of the analysis sample for the pre-policy period (1997 – 2001) in Table 3. The average characteristics of the Vietnam veterans who served in or around Vietnam (labeled Vietnam Vets) and those who did not (Other VEVs) are similar though by no means identical. Two notable differences are that those who actually served in Vietnam are significantly more likely to report a VA-rated Disability (17.5 versus 6.9 percent) and are somewhat more likely to be out of the labor force (16.5 versus 14.0 percent). They are also more likely to be black (10.1 versus 8.1 percent) and less likely to have attended and graduated from a four-year college (25.5 versus 30.4 percent).

We next examine the characteristics of DC Recipients just prior to the policy change. Table 4 provides information on the average characteristics of veteran males born between 1938 and 1954 who report that they have a VA-rated disability. The last five columns separate observations into one of five disability ratings categories contained in the CPS: 10 percent, 20 percent, 30-50 percent, 60-90 percent, and 100 percent.<sup>16</sup>

An examination of the non-labor force participation figures, contained in the row labeled “NLFP”, reveals that the fraction of DC recipients who are out of the labor force is generally increasing with the CDR. For example, while 14.5 percent of those with a ten percent rating are out of the labor force, 25 percent of those with a 20 percent rating and 43 percent of those rated between 60 and 90 percent are out of the labor force. The next row of this table labeled “NLFP – Disabled” lists the fraction who are out of the labor force because of a disability. Among those with a 10 or 20 percent rating who are out of the labor force, just 29 percent (equal to .071 divided by .249) report this is because of a disability. This fraction increases with the CDR, to 52 percent for those with a CDR of 30 to 50, 60 percent for those with a CDR of 60 to 90, and reaching a maximum of 75 percent for

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<sup>15</sup> Recall that the Vietnam service era includes the years 1964 to 1974. Thus a person who served from 1956 to 1965 is labeled a Vietnam era veteran, because their period of service would have overlapped with the Vietnam era.

<sup>16</sup> The actual categories are 1-10 percent, 11-29 percent, 30-50 percent, 51-99 percent, and 100 percent though because the CDRs are rounded to the nearest 10 we simplify here accordingly.

those with the maximum CDR of 100. However, it is unclear whether this negative association between the CDR and labor supply reflects the effect of increasingly severe disabilities or the causal effect of the associated increases in DC benefits.

### *B. Difference-in-Differences Estimates of the Impact of the Disability Compensation Program*

We first investigate whether there was a differential increase in DC enrollment among Vietnam veterans relative to other Vietnam era veterans who did not serve in or around Vietnam. Table 5 contains two different measures of DC enrollment by Vietnam veteran status in survey years 1997, 2001, and 2005. The first is the percent of veterans who report having a CDR greater than 10, and the second is the percent of veterans who report having a CDR greater than 50.

As the table shows, prior to the policy change, DC enrollment was substantially higher among Vietnam veterans compared to their other Vietnam era veteran counterparts. For example in August of 2001, 10.1 percent of Vietnam veterans reported that they were receiving DC benefits and had a CDR greater than 10 percent, compared to just 3.7 percent of Vietnam era veterans who did not serve in or around Vietnam. Despite the differences in levels, the differential increase in DC enrollment was very similar between the two groups prior to the policy, changing by 0.5 and -0.4 percent points among Vietnam veterans and Vietnam era veterans, respectively. However, during the next four years, DC enrollment among Vietnam veterans increased substantially, with the fraction having a rating greater than 10 percent or more increasing from 10.1 to 14.1 percent. In contrast, there was a slight decline for other Vietnam era veterans, from 3.7 to 3.5 percent.

Using a difference-in-differences estimator, we estimate that the policy increased the fraction of Vietnam veterans with a CDR greater than 10 percent by more than 4.1 percentage points, which is qualitatively similar to the previous estimate using administrative data.<sup>17</sup> Using the same estimator, the policy increased the fraction of Vietnam veterans with a CDR greater than 50 percent by 4.3

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<sup>17</sup> Recall our estimate of a 2.7 percentage point increase among Vietnam era veterans by September of 2007. Given that 47 percent of these veterans were affected by the policy, the implied estimate for Vietnam veterans would be 5.7 percentage points. And given that the CPS estimate is four years after the policy instead of six, one would expect the estimate to be one-third lower at approximately 3.8 percentage points.

percentage points.

We next consider various reduced-form effects of the policy. The first effect is the impact on labor supply among Vietnam veterans. In the final two columns of Table 5, we provide non-labor force participation figures by Vietnam veteran status. Similar to DC receipt, there are level differences in non-labor force participation prior to the policy –Vietnam veterans are slightly more like to be out of the labor force –but the change from 1997 to 2001 for the two groups was almost identical at 7.9 and 8.1 percentage points among Vietnam veterans and other Vietnam era veterans, respectively. However, in contrast to DC receipt growth, the change in non-labor force participation is nearly identical between the two groups after the policy: labor force participation declines by 9.7 and 9.6 percentage points among Vietnam veterans and other Vietnam era veterans, respectively.

The raw data suggest that the increase in DC receipt did not increase labor force exit among Vietnam veterans. However, these unconditional changes could mask important changes in the composition of the two groups. To account for this, we estimate a linear probability model with the following form:

$$Y_{jt} = \mu + \lambda * X_{jt} + \gamma_1 * VV_{jt} + \gamma_2 * VV_{jt} * (t - 2001) * I(t > 2001) + \sum_{t=1997}^{2005} \theta_t + \varepsilon_{jt},$$

where j and t index individuals and years, respectively. In this equation, the vector  $X_{jt}$  includes a set of background characteristics including indicator variables for the veteran’s race and education along with his age and age squared. The vector  $\theta$  represents a set of five indicator variables for each year of the survey, which are included to control for common changes in the outcome variable of interest  $Y_{jt}$  over time.

The variable  $VV_{jt}$  is equal to 1 if Vietnam era veteran j in survey year t reports that they served in Vietnam during the conflict there and zero otherwise. This variable is included to control for baseline differences between the treatment and comparison groups. To determine whether the outcome variable changed differentially for those directly affected by the policy, it is interacted with a

variable that is equal to the number of years after the policy (2 in 2003, 4 in 2005, and 0 otherwise). We use the differential-trend specification since the increase in DC enrollment was not instantaneous but rather close to linear over time; our results are qualitatively similar if we instead interact with just a post-policy indicator. The parameter of particular interest in this equation is  $\gamma_2$ , which captures the average differential change in Y for the treatment group, after controlling for background characteristics, in the years following the policy change.

The results from several specifications are summarized in Table 6. Consistent with the raw data displayed in Table 5, columns 1 and 2 of this table demonstrate that there is a substantial increase in the probability of DC enrollment among veterans who actually served in Vietnam. The estimated impact by 2005 (calculated by multiplying the coefficient estimate for  $\gamma_2$  by 4) is 3.5 percentage points for the CDR>10 measure and 4.2 percentage points for the CDR>50 measure. Both estimates are statistically significant at the one percent level.

In addition to Vietnam veteran status, we consider another demographic factor to further identify the treatment group: year of birth. Agent Orange was first used in Vietnam in 1965, so the presumption clause is more relevant for Vietnam veterans from younger birth cohorts who were more likely to be exposed to herbicides. We divide the analysis sample into younger and older birth cohorts – 1938 to 1945 and 1946 and 1954 – and find that much of the rise in DC receipt (measured as a CDR>10) after the policy was implemented is concentrated among younger birth cohorts: the rate increased by 1.2 percentage points per year among younger veterans, compared to a statistically insignificant .2 percentage points among Vietnam veterans from older cohorts.<sup>18</sup>

The next three columns explore the effect on labor supply, self reported health status, and household income. The statistically insignificant point estimate of -.06 for  $\gamma_2$  in specification 3

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<sup>18</sup> We also consider race to further identify those affected by the policy: among males born between 1944 and 1950 during the years 1997 and 2006 (controlling for educational attainment, veteran status, and age), blacks are 6.7 percentage points more likely to be diabetic (Singleton, 2009). Among black Vietnam era veterans, we find that DC enrollment differentially increased by 2 percentage points per year for those who served in or around Vietnam – compared to the baseline estimate of 1.0 percentage point - though the difference is not statistically significant.

suggests the policy change did not reduce the labor supply of affected veterans. However, the standard error of this point estimate is substantial and thus we cannot rule out a wide range of labor supply effects. For example, even if the program caused half of those induced onto the program to exit the labor force, we could not detect this given a standard error of 0.48. The next column yields a similar finding for health status as measured by self-reported disability, for which our estimate for  $\gamma_2$  is a statistically insignificant -.02. This estimate is smaller than the corresponding estimates for DC enrollment in specifications 1 and 2 by more than an order of magnitude.

The next specification considers the effect of the policy on economic well-being as measured by household income. The outcome variable is equal to one if household income exceeds \$40,000 and is zero otherwise.<sup>19</sup> Though the point estimate of 0.75 for  $\gamma_2$  is statistically insignificant, it is similar in magnitude to the corresponding estimate for DC enrollment, suggesting a 3 percentage point increase in the fraction of households with incomes above this range by August of 2005.

Previous research has emphasized that transfer income can have an effect on the labor supply of a person's spouse (Cullen and Gruber, 2000). To consider this issue, in Table 7 we report the results from specifications in which we focus only on married veterans in our analysis sample.<sup>20</sup> We further restrict attention to those whose wives were also born between 1938 and 1954. These two restrictions reduce our sample size by approximately half to 6913 married couples.

The results of specifications analogous to those in Table 6 are reported in Table 7. We find slightly larger effects of the policy on DC enrollment among married, Vietnam veteran males; though once again find little evidence for an effect on labor supply. However, in columns 5 and 6, we investigate the effect of the policy on both labor force participation and hours worked among the wives

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<sup>19</sup> The Veterans' Supplement unfortunately only measures income in categories. To the extent that the fraction in each income category rises over time (for example because of inflation) this should be captured by the year effects.

<sup>20</sup> One concern with conditioning the sample on married Vietnam veterans is that the policy may have affected marriage strategies. However, using the sample of all Vietnam veterans, estimates from a linear probability model suggests that there was no statistically significant change in the probability of marriage among Vietnam veterans relative to other Vietnam era veterans after the policy was implemented.



of Vietnam veterans. Here we detect a statistically significant increase in the probability that the wives are out of the labor force and a significant decline in hours worked.<sup>21</sup> This suggests there may be important labor supply effects of this policy, with at least part of the effect arising through wives who reduce their work effort.

#### **IV. Discussion**

Virtually all of the prior literature on disability insurance programs has focused on the Social Security Disability Insurance and Supplemental Security Income programs, with almost no consideration of the VA's Disability Compensation program. In this paper, we briefly describe the key features of the DC program and estimate the effect of the DC program on the health, labor supply, and economic well-being of beneficiaries. The response to DC benefit generosity is identified by a recent and unique policy change that deemed diabetes a service-connected disability for Vietnam veterans. To the best of our knowledge, this is the only significant change to a federal disability program in the U.S. that has applied to one group of adults but not others.

Using administrative data from the U.S. Department of Veterans Affairs, we estimate that the policy increased disability enrollment among Vietnam veterans by approximately 6 percentage points and increased the monthly benefit amount for an additional 1.7 percent of Vietnam veterans. We further estimate that the policy increased DC expenditures by \$2.85 billion in the 2007 fiscal year and by \$50 billion in present value terms. Using micro-level data from the Veterans Supplement to the Current Population Survey, we find no measurable effect of increased benefit receipt on the health or labor supply of Vietnam veterans, but do detect a small decline in labor supply and hours worked among their wives. However, there were just 14,000 Vietnam era veterans in our analysis sample constructed from CPS data, so additional research with better data is clearly warranted.

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<sup>21</sup> The labor supply equations were estimated using Seemingly Unrelated Regressions at the couple level, which permits correlation in the error terms of the labor supply equations within couples.

What do these findings imply for other disability programs such as SSDI and SSI? Because only Vietnam veterans were directly affected by this policy change, one cannot assume that a similar change for those programs would have the same response. Additionally, because the DC program is quite different from SSDI and SSI, which pay benefits on an all-or-nothing basis and do not allow recipients to have significant earnings, the effect of such a change in these other programs might be quite different (Autor and Duggan, 2007). However the findings do demonstrate that a relatively narrow change in the medical eligibility criteria for the DC program led to an increase in disability benefits for approximately 8 percent of the individuals potentially affected by the policy. This makes it more plausible that the 1984 reforms to SSDI and SSI, which substantially expanded the medical eligibility criteria for these programs, could have caused much of the increase in enrollment for both programs during the past two decades.

The VA's Disability Compensation program is a large and rapidly growing program that has been essentially ignored in prior economic research. At present, thirteen percent of military veterans are receiving DC benefits with \$31 billion paid to them in cash benefits during the 2008 fiscal year. Thus more work on the Disability Compensation program, an increasingly important source of income and insurance for the nation's military veterans and their family members, seems warranted.

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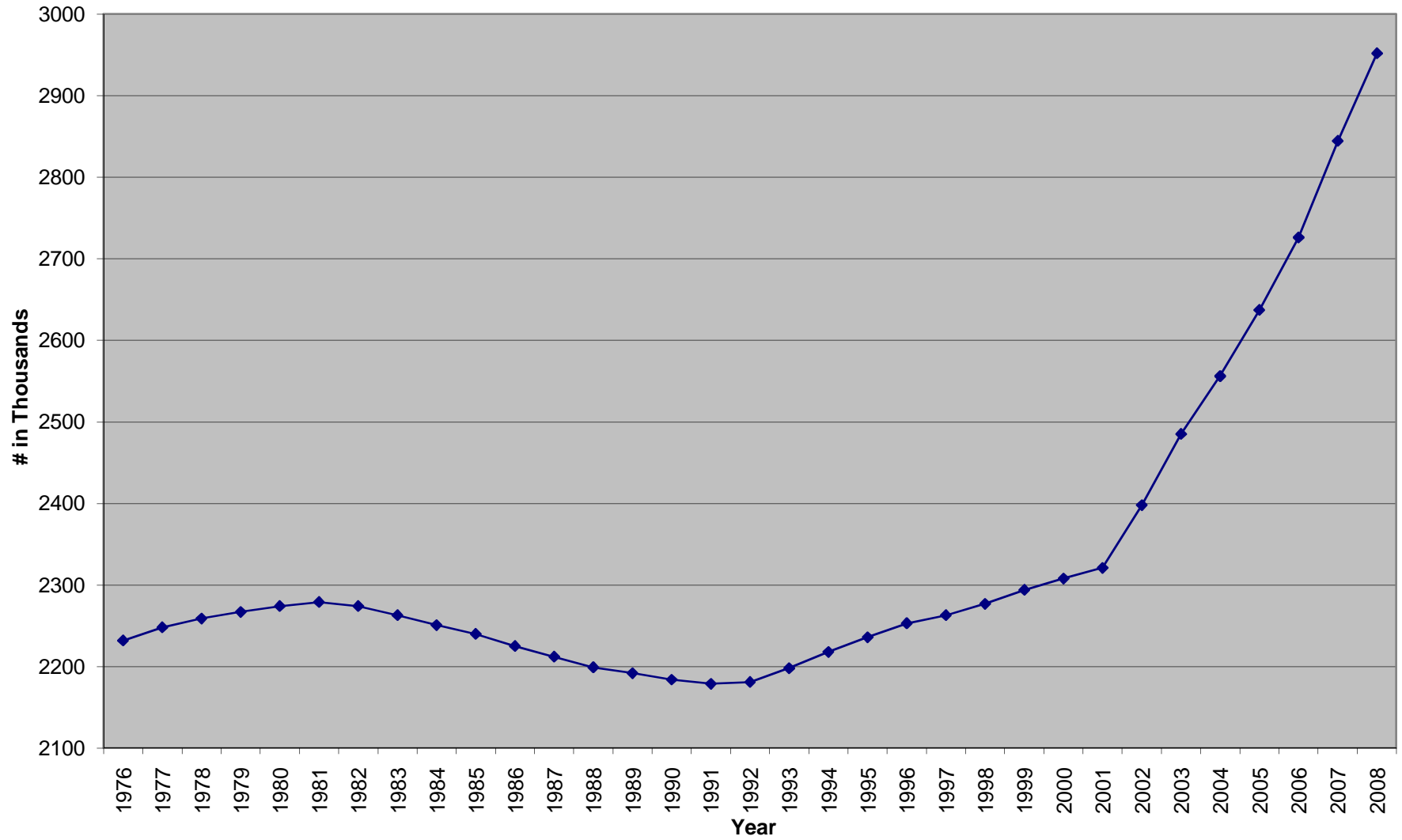
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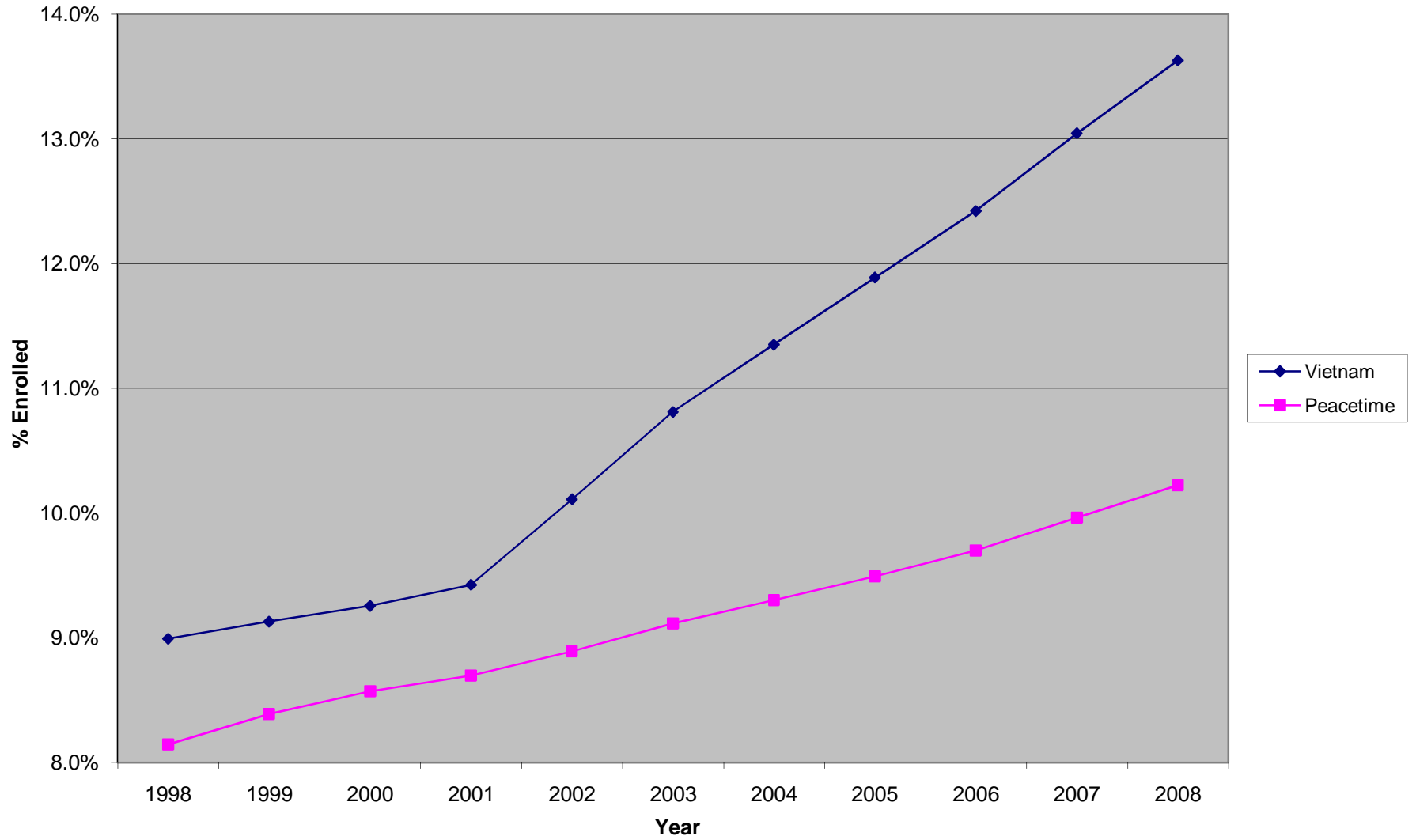
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**Figure 1: # of Disability Compensation Recipients: 1976-2008**



**Figure 2: DC Enrollment for Vietnam and Peacetime Era Veterans: 1998-2008**



**Table 1: The Number of Existing DC Recipients Affected by the Agent Orange Decision**

Year	Endocrine System		Discrepancy		Diabetes vs. Other	
	Awards	Recipients	Unadjusted	Adjusted	Diabetes	Other Endo
1998	2,350	56,416				
1999	2,501	57,576	-1,341	0	37,808	19,768
2000	2,485	58,719	-1,342	-1	37,985	20,734
2001	5,913	68,040	3,408	4,749	46,395	21,645
2002	39,852	134,905	27,013	28,354	111,932	22,973
2003	36,897	185,908	14,106	15,447	161,551	24,357
2004	26,206	217,126	5,012	6,353	191,649	25,477
2005	26,274	247,324	3,924	5,265	220,532	26,792
2006	25,457	276,094	3,313	4,654	247,992	28,102
<b>Total</b>				<b>64,821</b>		

Data in the first column provide the number of DC awards in each fiscal year with an endocrine system condition. The entries in the second column contain the number of DC recipients at the end of each fiscal year with an endocrine system condition. Data in the third column equals the number of recipients in year t (column 2 year t) minus the sum of the number at the end of the previous year (column 2 year t-1) and the number of awards (column 1 year t), with the fourth column simply adding 1341 to this number to account for the estimated exit that would have occurred. The final two columns distinguish between diabetes and all other endocrine system disorders among those recipients with an endocrine condition. Of the 247,992 with diabetes in September of 2006, more than 215,000 are from the Vietnam era. Source of this data - the VBA's Annual Benefits Report publication.

**Table 2: Monthly DC Expenditures for Vietnam and Peacetime Era: 9/1998 - 9/2007**

Month Year	Vietnam Era		Peacetime Era		All Service Eras	
	DC Spending	% Increase	DC Spending	% Increase	DC Spending	% Increase
Sept 1998	\$435,984	6.86%	\$231,904	6.70%	\$1,101,300	5.31%
Sept 1999	\$464,885	6.63%	\$246,384	6.24%	\$1,158,548	5.20%
Sept 2000	\$499,453	7.44%	\$262,879	6.69%	\$1,231,115	6.26%
Sept 2001	\$542,045	8.53%	\$279,511	6.33%	\$1,317,185	6.99%
Sept 2002	\$624,907	15.29%	\$300,815	7.62%	\$1,465,761	11.28%
Sept 2003	\$716,975	14.73%	\$322,295	7.14%	\$1,627,995	11.07%
Sept 2004	\$802,545	11.93%	\$341,046	5.82%	\$1,781,844	9.45%
Sept 2005	\$891,052	11.03%	\$361,381	5.96%	\$1,953,622	9.64%
Sept 2006	\$979,868	9.97%	\$383,190	6.03%	\$2,135,238	9.30%
Sept 2007	\$1,075,429	9.75%	\$406,944	6.20%	\$2,344,595	9.80%
Projected 2007	\$837,847		\$406,051		\$1,884,209	
Actual - Projected 2007	\$237,582		\$893		\$460,386	
% of Projected 2007	28.36%		0.22%		24.43%	

Expenditure amounts represent the amount paid to DC recipients for the Vietnam era (column 1), peacetime era (column 3), and all service eras (column 5) in September of each year. % Increase represents the percent change from the previous year to the current year. The "Projected 2007" row assumes that the growth rate from 1998-2001 would have continued for the next six years, with the "Actual-Projected 2007" row listing the discrepancy between actual and projected monthly expenditures. The final row lists the percent by which actual spending exceeded projected spending for each of the three groups. Data source was the VA Administrative Report, RCS 20-0223.

**Table 3: Descriptive Statistics by Veteran Status: CPS Veteran Supplement**

	Vietnam Vets	Other VEVs
Observations	4,756	4,958
Married	74.7	77.2
Age	52.1	52.1
White	88.0	90.1
Black	10.1	8.1
Other	1.8	1.8
Less than HS	5.1	4.8
HS	33.4	31.3
Some College	36.0	33.5
College and Beyond	25.5	30.4
NLFP	16.5	14.0
NLFP - Disabled	7.6	5.6
Work Disabled*	7.6	5.7
VA Disability*	17.5	6.9

Analysis sample is pooled 1997, 1999, and 2001 CPS Veteran Supplements, restricted to male Vietnam era veterans born between 1938 and 1954. There are 3 missing values for "disabled" among the entire sample and 1039 missing values for "VA Disability" - statistics conditional on non missing values. Among the 1041 veterans who report having a VA Disability, 963 report a VA service-connected disability rating. Vietnam Vets refers to Vietnam era veterans who report serving in the Vietnam theater while Other VEVs refers to all other Vietnam era veterans. Veteran sample weights were used.

**Table 4: Summary Statics Among Veterans with Rated Disability by Rating**

VA Disability Status	None	VA Disability	VA Rating	Combined Disability Rating					
				0	1-10	11-29	30-50	51-99	100
Observations	10,207	1,221	1,123	97	350	152	263	115	146
Married	77.5	72.0	72.6	77.2	77.4	68.3	74.2	77.0	56.7
Age	53.0	52.4	52.5	52.5	52.6	52.5	52.0	52.8	52.6
White	90.4	84.1	84.1	89.5	86.3	78.7	84.2	77.3	85.8
Black	8.0	12.1	12.1	7.0	10.6	14.3	12.8	17.3	11.4
Other	1.6	3.7	3.8	3.6	3.0	7.0	3.0	5.4	2.7
Less than HS	5.7	6.4	6.0	2.6	5.1	4.8	5.1	7.8	11.3
HS	34.1	26.4	25.6	28.8	22.8	19.4	23.7	31.0	35.3
Some College	33.1	38.8	39.5	42.5	38.7	42.3	40.3	37.6	36.6
College and Beyond	27.1	28.5	28.9	26.1	33.4	33.4	30.9	23.5	16.8
NLFP	14.7	31.8	32.0	19.7	14.5	24.9	24.4	43.2	91.5
NLFP - Disabled	5.3	17.5	17.3	3.8	3.6	7.1	12.8	26.1	68.7
Work Disabled*	5.3	17.4	17.3	3.8	3.6	7.1	12.8	26.1	68.7
VA Payment*	-	81.2	82.8	1.4	82.5	90.9	92.0	96.8	97.3
VA Ever Prevent Work*	-	31.5	31.8	7.8	10.5	32.4	33.1	50.0	80.0

Analysis sample is pooled 1997, 1999, and 2001 CPS Veteran Supplements, restricted to male Vietnam era veterans born between 1938 and 1954. The second column contains veterans who reported a VA disability. The third column contains only those who reported VA service-connected disability rating. The subsequent columns break out the sample by VA disability rating. Among the 1123 with a VA Disability, there was 1 missing value for 'Work Disabled', 11 missing values for 'VA Payment' (only available for 1997 and 1999); 9 missing values of 'VA Ever Prevent Work'. Veteran sample weights were used.



**Table 5: DC Rating and Labor Force Non-Participation by Vietnam Service Status**

Year	DC Receipt, CDR>10		DC Receipt, CDR>50		NLFP	
	Vietnam Vets	Other VEVs	Other VEVs	Vietnam Vets	Other VEVs	Vietnam Vets
1997	3.1 (0.5)	10.6 (0.9)	1.4 (0.3)	5.4 (0.6)	10.5 (0.8)	12.0 (0.9)
2001	3.7 (0.5)	10.1 (0.8)	1.8 (0.3)	5.1 (0.6)	18.4 (1.0)	20.0 (1.0)
2005	3.5 (0.5)	14.1 (1.0)	1.7 (0.3)	9.3 (0.8)	28.0 (1.1)	29.7 (1.3)
Diff: 01-97	0.5 (0.7)	-0.4 (1.2)	0.4 (0.5)	-0.3 (0.8)	7.9 (1.3)	8.1 (1.4)
Diff: 05-01	-0.2 (0.7)	3.9 (1.2)	-0.1 (0.5)	4.2 (1.0)	9.6 (1.5)	9.7 (1.6)

Analysis sample is pooled 1997, 1999, 2001, 2003, and 2005 CPS Veteran Supplements, restricted to male Vietnam era veterans born between 1938 and 1954. Vietnam Vets refers to Vietnam era veterans who report serving in the Vietnam theater while Other VEVs refers to all other Vietnam era veterans. There are missing values for the some observations among the full sample. To keep the sample consistent across outcomes, the sample here contains only observations with all relevant information in the table. Veteran sample weights were used. Standard errors are listed below the estimates.

**Table 6: The Impact on DC Receipt, LFP, Disability Status, Household Income, and Marital Status**

Dependent Variable	CDR>10	CDR>50	NLFP	Disabled	HH Inc>=60k	Married
Sample Mean	7.20	3.84	19.34	7.19	44.98	76.56
Vietnam Vet	6.69 (0.63)***	3.39 (0.46)***	2.67 (0.86)***	1.72 (0.59)***	-2.65 (1.17)**	-1.94 (1.01)*
Posttrend * Vietnam Vet	0.87 (0.33)***	1.04 (0.26)***	-0.06 (0.48)	-0.02 (0.32)	0.71 (0.60)	0.48 (0.51)
Observations	14414	14414	14414	14411	12958	14414

Analysis sample is pooled 1997, 1999, 2001, 2003, and 2005 CPS Veteran Supplements, restricted to male Vietnam era veterans born between 1938 and 1954. Vietnam Vets refers to Vietnam era veterans who report serving in the Vietnam theater. There are missing values for the some observations among the full sample. To keep the sample consistent across outcomes, observations were deleted if rated as missing or, if rated, the rating was missing. This criterion reduces the sample from 16514 to 14414 observations. Among the 14414 observations, 1456 observations were missing household income data, so the sample is reduced to 12,958 observations for household income regressions. Regressions include controls for educational attainment (less than high school, some college, and college graduate relative to high school graduates), race (white and other relative to black), year (1999, 2001, 2003, and 2005 relative to 1997) and age (age and age squared). Estimates are factored by 100 and therefore interpreted as percentage point changes. Veteran sample weights were used. Robust standard errors are listed below the estimates.

**Table 7: Linear Probability Models of DC Receipt and Household Income: Married Veterans and their Wives**

Dependent Variable	CDR>10	CDR>50	Husband		Wife	
			NLFP	Hours	NLFP	Hours
Mean of Dep Variable	6.1	2.9	19.2	34.7	30.8	25.5
Vietnam Vet	5.46 (0.89)***	2.55 (0.62)***	2.43 (1.21)**	0.15 (0.67)	-0.44 (1.44)	0.31 (0.67)
Posttrend * Vietnam Vet	1.16 (0.43)***	1.15 (0.32)***	-0.27 (0.55)	-0.28 (0.30)	1.11 (0.65)*	-0.56 (0.30)*
Observations	6913	6913	6913	5863	6913	5863

Analysis sample is pooled 1997, 1999, 2001, 2003, and 2005 CPS Veteran Supplements, restricted to married male Vietnam era veterans born between 1938 and 1954 whose wives were also born between 1938 and 1954. Vietnam Vets refers to Vietnam era veterans who report serving in the Vietnam theater. There are missing values for some observations among the full sample. To keep the sample consistent across outcomes, observations were deleted if rated was missing or, if rated, the rating was missing. This criterion reduces the sample from 7914 to 6913 observations. DC receipt regressions include controls for educational attainment (less than high school, some college, and college graduate relative to high school graduates), race (white and other relative to black), year (1999, 2001, 2003, and 2005 relative to 1997) and age (age and age squared). For the labor supply models, we allow the error terms to be correlated couples using Seemingly Unrelated Regressions. The sample size is reduced for the hours worked specification due to missing values of the husband or wife or both. Estimates are factored by 100 and therefore interpreted as percentage point changes. Veterans sample weights were used. Robust standard errors are listed below the estimates.